

"ACUTE INTESTINAL OBSTRUCTION IN ADULTS"

[An analytical study of 75 cases]



**Dissertation submitted to
Coimbatore Medical College for
M.S. Degree in General Surgery
Branch I**



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COIMBATORE – 641 014.

CERTIFICATE

Certified that this is the bonafide dissertation done by
Dr. J. Romul Dhayan Raja and submitted in partial fulfillment of the
requirements for the Degree of M.S. General Surgery, Branch -I of the
Tamil Nadu Dr. M.G.R. Medical University.

PLACE :

DATE :

UNIT CHIEF

DEAN
COIMBATORE MEDICAL
COLLEGE HOSPITAL

PROFESSOR & HEAD
OF THE DEPARTMENT
OF SURGERY

COIMBATORE

DECLARATION

I solemnly declare that the dissertation titled "**ACUTE INTESTINAL OBSTRUCTION IN ADULTS**" (An analytical study of 75 cases) was done by me at Coimbatore Medical College and Hospital, Coimbatore, during the period of January 2004 to December 2005 under the guidance and supervision of **Prof. Dr. G.S. Ramachandran, M.S., MNAMS.**

The dissertation is submitted to the Tamil Nadu Dr. M.G.R. Medical University towards the partial fulfillment of the requirement for the award of **M.S. DEGREE BRANCH – I IN GENERAL SURGERY.**

PLACE :

DATE :

Dr. J. ROMUL DHAYAN RAJA

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Contents

CONTENTS

CHAPTER NO.	TOPIC	PAGE NO.
1.	Introduction	1
2.	Aim of the Study	3
3.	Historical Highlights	4
4.	Review of Surgical Embryology, Anatomy and Physiology	6
5.	Review of Literature	
	▪ Patho Physiology	16
	▪ Fluid & Electrolyte Balance and Principles in treatment	25
	▪ Diagnosis	29
6.	Materials and Methods of Study	36
7.	Observations in this Study	39
8.	Discussion	56
9.	Conclusion	67
	Bibliography	
	Annexure – 1 Proforma	
	Annexure – 2 Master Chart	

Introduction

INTRODUCTION

Acute Intestinal Obstruction is the main surgical emergency problem which a general surgeon has to face place every day irrespective of day and night. It is quite an exciting experience to examine, investigate, diagnose, explore and look into the abdominal cavity where it would reveal the puzzling conditions. A surgeon adds this experience to his knowledge everyday from each and every case.

Acute intestinal obstruction can result from a variety of causes, and there is a tendency to concentrate on the features of intestinal obstruction itself. Success in the treatment of Acute intestinal obstruction depends largely upon early diagnosis, skillful management, and the appreciation of the importance of treating the pathologic effects of the obstruction just as much as the cause itself.

The abdomen is said to be a magic box and so long as its lid remains unopened heaven alone knows what lies within it. But every attempt should be made to arrive at a provisional diagnosis before embarking on surgery. The rapid onset and progress of the clinical feature and the spread with which the morbidity set in endangers the patients inspite of recent advances still this condition holds a major share of mortality due to so many practical factors which provoked to study and analyse this interesting subject.

Since life to death is an one way traffic, it is no harm to open an acute abdomen in doubt rather than to wait and worry later for our act.

The failure in the initial attempt is not a short coming and at the same time the initial success is not a winning pole. Both are experience and both are catalysts for the future knowledge of a young and energetic surgeon. This dissertation is undertaken because early diagnosis and early interference is of immense value in preventing mortality in case of acute intestinal obstruction.

Yet the adage noted by earliest surgeon still holds good "Never let the sun set or rise in a case of acute intestinal obstruction".

Aim of Study

AIM OF THE STUDY

1. To study and analyse the incidence of acute intestinal obstruction in adults admitted during Jan. 2004 – Dec. 2005 in Coimbatore Medical College and Hospital.
2. To identify the cause of acute intestinal obstruction.
3. To identify the factors modifying the prognosis of the patient.
4. To study about mortality and morbidity rate in the analysed cases.
5. To study the clinical parameters useful in deciding the need for surgical intervention.

Historical Highlights

HISTORICAL HIGHLIGHTS

¹Intestinal obstruction has been recognized as a disease entity for thousands of years. **Hippocrates** considered intestinal obstruction a "physician's repository" and recommended treatment with a combination of enemas and inflation of the rectum. Probably the earliest authentic report of an operation for this disease was by **Praxagoras** in the third or fourth century B.C. The operation was the creation of an intestinal fistula (stoma) to relieve intestinal obstruction caused by a strangulated inguinal hernia. Although the surgical approach was widely recognized, it generally was condemned because of the high mortality of the condition, regardless of the treatment, and the pain and numerous complications that resulted. A wide variety of nonoperative procedures were utilized in the treatment of intestinal obstruction, including the use of inverted posture, metallic mercury, opium, electrical stimulation, gastric lavage, and percutaneous intestinal puncture. The use of cautery for strangulated hernias were advocated up through the sixteenth century. The use of enemas and bleeding was popular well into the nineteenth century.

The surgical approach to intestinal obstruction became more frequently utilized in the nineteenth century, with a subsequent dramatic drop in the mortality rate to 60 per cent by 1908 and 20 per cent by 1940. The decrease in mortality rate was, in part, related to improved surgical and anesthetic techniques, but primarily to a better understanding of the fluid and electrolyte shifts that occur in small bowel obstruction and the ability to correct the intravascular losses by the administration of saline solutions. In subsequent years, the morbidity and mortality of intestinal obstruction has been decreased further by the use of decompression intestinal tubes placed through the nose or mouth, beginning in the 1930s, and the introduction of antibiotics in the 1940s. Further

improvements, particularly in acute care, surgical, and anesthetic techniques, have reduced the mortality for nonstrangulation obstruction to as little as 5 per cent and have reduced substantially the morbidity and mortality of strangulation obstruction.

Review of Surgical Embryology, Anatomy and Physiology

REVIEW OF SURGICAL EMBRYOLOGY, ANATOMY AND PHYSIOLOGY

I. EMBRYOLOGY

²At an early stage of development, a tube suspended in the midline of abdominal cavity by a ventral and dorsal mesentery represents the alimentary canal.

	Parts	Arterial Supply	Functions
Foregut	Stomach, duodenum as far as the major duodenum papilla	Coeliac Axis	Digestive
Midgut	Ampulla to the junction of middle with the left third of transverse colon	Superior mesenteric artery	Absorptive
Hindgut	Left third transverse colon to proximal part of rectum	Inferior mesenteric artery	Excretory

II. ANATOMY

With respect to the Acute Intestinal Obstruction the structures involved are

- A. The intestines
- B. The peritoneal fossae

- C. The Accessory peritoneal recesses
- D. Unusual bands of peritoneum or membrane.

INTESTINES

³It is divided into small bowel and large bowel. The intestines is divided microscopally into serosa, outer longitudinal and inner circular muscle layer, muscularis mucosae, lamina propria and epithelium from outside to inside.

THE SMALL INTESTINE

It extends from pylorus to the ileocaecal junction and is comprised of Duodenum, Jejunum and ileum.

Duodenum

It is 25 cm long and it makes a 'C' shaped bend which embraces the head of the pancreas. It is divided into four parts 5 cms, 7.5 cms, 10 cms, and 2.5 cms long respectively. It is mostly retroperitoneal and related to the pancreas, portal veins and the bile duct.

Jejunum And Ileum

The Jejunum and Ileum together lie in free margin of mesentery with varying length of 4 to 6 meters of which $\frac{2}{5}$ th is Jejunum. It is entirely surrounded by peritoneum. The mesentery extends from left side

of L2 to the right iliac fossa crossing the 3rd part of duodenum, Aorta, IVC and the right ureter in its course. The last 5 cm of the terminal ileum is fixed in the right iliac fossa.

The Jejunum and Ileum can be differentiated based on its blood supply. In the Jejunum one or two arterial arcades in the mesentery with parallel vessels 3 to 7 cms going to the gut. In the ileum two or three arterial arcades in the mesentery with parallel vessels 1 to 2 cms going to the gut.

The ileo caecal valve is the narrow channel between the two intestines usually forms as one way traffic except in some exceptional conditions. The valve makes the caecum to bear the burnt of the attack in cases of closed loop obstructions.

THE LARGE INTESTINE

⁴It is a muscular tube which extends from the ileocaecal junction to anus and is comprised of caecum and appendix, ascending colon, transverse colon, descending colon, sigmoid colon, rectum and the anal canal. It is approximately 135 cms long. The circular muscle layer is continuous but the longitudinal muscle is arranged in three bands. The

taenia coli as far as rectum where these bands fuse to form a continuous layer.

Those parts with mesenteries like transverse colon, Pelvic colon and appendix are completely surrounded by peritoneum except for a narrow band between the two layers of the mesenteric attachment. The other parts of the colon are devoid of peritoneum over posteriorly. The caecum is completely surrounded by peritoneum, except a small part posteriorly and superiorly.

BLOOD SUPPLY AND VENOUS DRAINAGE

The superior mesenteric artery and inferior mesenteric artery and their branches supply the intestine. A minor role is played by the coeliac axis as far as the duodenum is concerned. The venous drainage ultimately empties into portal venous system formed by the union of superior mesenteric vein and splenic vein. The inferior mesenteric vein joins the latter.

LYMPHATIC DRAINAGE

A.Parietal : This lies in relation to large blood vessels such as

1. External iliac
2. Common iliac
3. Hypogastric or internal iliac.

4. Lumbar, Para aortic

B.Viseral : Lies along superior and inferior mesentirc vessels.

NERVE SUPPLY:

Is by parasympathetic and sympathetic nerves derived from the celiac and pelvic plexus. The parasympathetic fibers are preganglionic and they are motor in function to the gut and secreto motor to the gland.

The sympathetic fibers are inhibitory action to the gut muscles and motor to the muscle sphincter. The fibers are distributed along the meshes of the Aeurbach plexus and meissner plexus where as in the para sympathetic the motor fibers lie along the myenteric plexus of Aeurbach and the secreto motor fibers for the gland along the plexus of meissners.

THE PERITONEAL FOSSAE

These fossae have great surgical importance as owing to the possibility of a portion of the gut herniating into these fossae and getting strangulated.

They are :

1. Lesser sac of peritoneum
2. The duodenal fossae
3. The inter sigmoid fossae

4. The caecal fossae.

ACCESSORY BANDS OF PERITONEUM OR MEMBRANE

There are several bands and membranes eg. The trans duodenal band of Ladd. It is congenital one. It is found in malrotation of gut. The caecum remains in the left hypochondrium and a peritoneal band is found running from the caecum to the right side of abdomen and then cross the second part of duodenum, others are.

1. An obliterated vitello intestinal duct.
2. A string like frequently thin and fragile band, following previous bacterial peritonitis.
3. A portion of greater omentum adherent usually to parities constitutes an obstructing band.
4. Post operative fibrous adhesions.

III. PHYSIOLOGY OF INTESTINES

The main functions are:

- a. Digestion
- b. Absorption and
- c. Peristaltic Movement.

DIGESTION

The various gastric, intestinal, Hepatic and pancreatic juices are responsible for digesting the food material.

ABSORPTION

The absorptive power can be classified as follows:

1. Proximal and mid : Sugar and Amino acids, iron
small intestines Calcium, Water solute vitamin and
fat.
2. Distal small intestines : Bile salt and vitamin B₁₂.
3. Colon : Water and electrolytes, short chain
fatty acids and very lesser extent of
amino acids and glucose.

4. Rectum : The drugs may be absorbed here in the form of retention enema.

PERISTALTIC MOVEMENT

⁵There are three types

1. Rhythmic contraction
2. True peristaltic movement
3. Mass contraction.

The rhythmic contraction or segmentation is myogenic in origin. This is best developed in the ileum, less in jejunum and rare in duodenum. This movement helps in thorough mixing of the food.

The true peristaltic movement occurs in the whole length of the intestine but in different degrees. The amplitude and propagatory distance vary with the phase of digestion over the loop proximal to the obstruction. This is dependent upon the loaded condition of the bowel. But the rate of peristaltic waves remains constant, irrespective of the digestive phase, whether the lumen is loaded or empty. Mass contractions occur in colon.

In Acute Intestinal Obstruction the pain occurs as a first evidence which is due to vigorous muscular contraction of the bowel, the result of the local reflex, an attempt to propel the obstructing agent.

The vomiting is very severe in the obstruction at a higher level and prevents the intake of fluid, leading to dehydration. The abdominal distention is not so marked. In the low level obstruction fluid accumulates in the lumen more slowly and the vomiting is delayed. If the stomach and much of small bowel become loaded with fluid, there will be considerable abdominal distension.

The distention is due to accumulation of gas and fluid proximal to obstruction. The gas very rapidly equilibrates with blood gases which are derived from swallowed atmospheric air and mild amount of methane and hydrogen disulphide which are produced in the intestine itself.

The losses are principally of water, sodium and potassium. But in addition if there is strangulation of a segment of bowel there is also a significant loss of both RBC and plasma. General factors contribute to the overall loss which is chiefly from extracellular compartment.

1. There is obvious loss by vomiting.

2. Due to the presence of vomiting further obstinance of dietary in take.
3. In addition to the liquid expelled by vomiting a considerable quantity of secretions and other liquid may be sequestered in the lumen of the small bowel proximal to the obstruction and there fore loss into the tissue spaces.
4. The area of absorptive mucosa distal to the level of obstruction is unavailable for the process of absorption.
5. There is increase in the loss of fluid and electrolyte from an obstructed segment of bowel, the flux into the lumen across them continuing but being accompanied by a marked reduction of fluid in the opposite direction.
6. If strangulation is present and edematous exudates occurs into the damaged segment of bowel, considerable amount of this fluid can exude from the serosal aspect.
7. Finally in strangulation there may be loss of frank blood or plasma from the affected segment.

Review of Literature

PATHO PHYSIOLOGY OF ACUTE INTESTINAL OBSTRUCTION

DEFINITION

Intestinal obstruction is defined as a partial or complete interference with the passage of stools distal to obstruction.

CLASSIFICATION

1. Depending upon the nature of obstruction.
 - a. Dynamic obstruction / mechanical obstruction
 - b. A dynamic obstruction – paralytic ileus
2. Depending upon the cause of obstruction
 - a. **Intrinsic lesions**
 1. Congenital - Atresia, stenosis, agenesis
 2. Inflammatory - Crohn's, TB and radiation enteritis
 3. Neoplasms - Metastatic, primary malignant and benign
 4. Intussusceptions
 5. Traumatic and toxic - hematoma, stenosis from caustics
 - b. **Extrinsic lesions**
 1. Hernias - internal and external
 2. Adhesions

3. Congenital bands
4. Volvulus
5. Compressing masses - tumors, abscess, hematoma, anomalous vessels

c. Intraluminal bodies

1. Foreign - ingested or inserted
2. Gallstones
3. Bezoars
4. Feces
5. Barium
6. Meconium
7. Intestinal parasites

d. Neuromuscular disorders

1. Paralytic (adynamic) ileus
2. Spastic ileus
3. Aganglionic bowel segments - Hirschsprung's disease)
4. "Idiopathic" pseudo-obstruction

e. Vascular occlusion

1. Arterial – emboli, atherosclerosis
2. Venous - low flow states
3. Can also be classified as
 - a. Simple obstruction
 - b. Strangulated obstruction
 - c. Closed loop obstruction

The site most liable to be involved in intestinal obstruction varies according to the causative agent.

The commonest type of obstruction due to strangulated inguinal or femoral hernia generally involves distal ileum. The obstruction due to malignancy is generally located in the colon. ⁷There are four distinct types of obstruction.

They are

1. Simple occlusion of the lumen without impairment of Blood supply to the part.
2. Closed loop obstruction where a segment of bowel is occluded at two points.
3. Strangulation in which in addition to obstruction the blood supply is implicated.
4. Paralytic ileus where there is no organic block, but a functional obstruction due to paralysis of the gut.

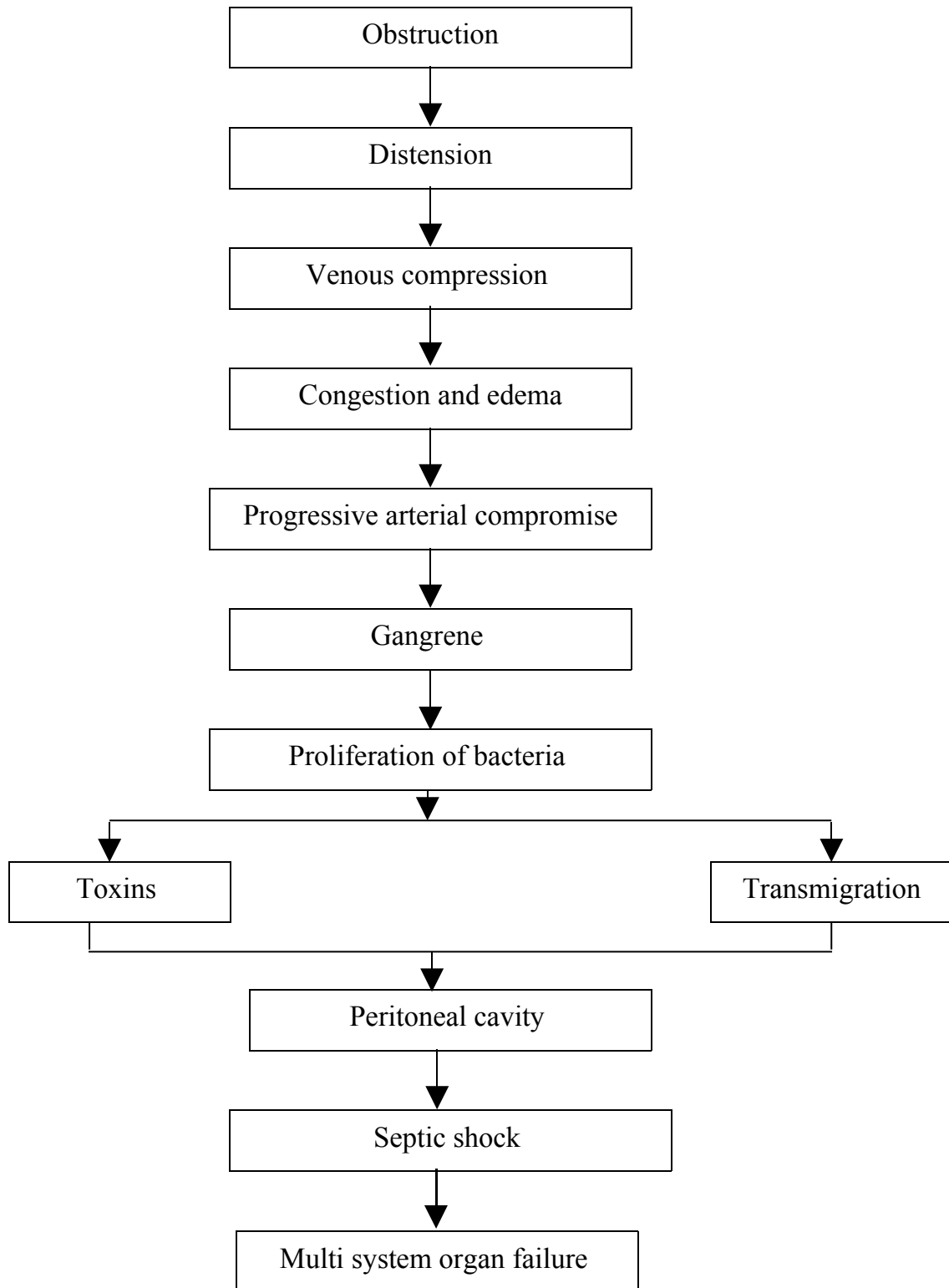
The fluid and electrolyte balance is grossly effected in all types of obstruction. In a healthy individual in addition to the fluid intake by mouth, approximately 8000ml of fluid secreted by salivary gland,

stomach, liver, pancreas and intestinal glands in 24 hrs, in addition large quantities of fluid and electrolytes are constantly being transferred in both direction across intestinal mucosa between the blood stream and the intestinal lumen. As a final result of the bi-directional movement, most of the fluid is absorbed leaving only 100 ml as the fluid content of the faces.

In intestinal obstruction the intestine above the point of obstruction endeavour to over come the obstruction by vigorous peristalsis. This continues for a period of 48 hrs to several days. If the point of obstruction is more distal the longer does it remain vigorous. The obstruction ultimately produces a retrograde peristalsis that results in vomiting. If the obstruction is not relieved a time is reached when increasing distension ceases peristalsis and obstructed intestine becomes flaccid and paralysed.

The intestine below the obstruction exhibits normal peristalsis for two or three hours and the absorption continues until the contents below the obstruction are cleared off. Then the empty intestine becomes immobile. Collapsed and pale, remain in the same condition until the obstruction has been overcome.

⁸Patho Physiology of Acute Intestinal Obstruction



⁹The distension occurs above the level of obstruction and begins immediately after the obstruction, the cause of distension are gas and fluids.

Gas : Regardless of the level of obstruction, there is significant over growth of both aerobic and anaerobic organism resulting in considerable gas production following the reabsorption of oxygen and carbon dioxide. The majority is made up of nitrogen (90%) and hydrogen sulphide (8%) Other gases (2%).

Swallowed air	- 68%
Diffusion from bowel lumen	- 22%
Products of digestion & bacterial activity	- 10%

Fluid : This is made up of various digestive juices. Dehydration and electrolyte loss are therefore, due to,

- Reduced oral intake
- Defective intestinal absorption
- Losses due to vomiting
- Segmentation in the bowel lumen.

Depletion and its rapidity depends upon the level of obstruction.

THE BACTERIAL TOXINS

The toxic substances are undoubtedly formed in the stagnant contents of the distended gut and they are of great importance when the bowel is strangulated. As long as the intestinal wall is healthy the toxins can do little harm. If the obstruction is at low level the effect will be more due to heavy bacterial over growth. ¹⁰When the bowel wall is devitalized both bacterial toxin and the products of autolysis pass in to the peritoneal cavity, then to be absorbed into the circulation. This is followed by migration of bacteria and peritonitis follows. The substances involved are endotoxins of gram negative bacilli, neither living tissue nor mucous membrane are necessary for the formation of toxin. The toxin doesn't pass through normal mucous membrane. The absorption of the toxin is more important than its production as the toxin is physiologically lost, if it exists within the loop. The circulatory damage aids the absorption.

STRANGULATION

¹¹When strangulation occurs the viability of the bowel is threatened secondary to a compromised blood supply. This may be due to,

- External compression (External Hernias bands, Adhesions)
- Interruption of mesenteric flow (volvulus, intussusceptions).

- Rising intraluminal pressure (closed loop obstruction).
- Primary obstruction of intestinal circulation (mesenteric infarction).

The venous return is compromised before the arterial supply unless primary obstruction is present. The resultant increase in capillary pressure leads to local mural distension with loss of intravascular fluid and RBCs intramurally, intra and extra luminally. Once the external supply is impaired hemorrhagic infarction occurs and proceeds to necrosis and perforation. ¹²As the viability of the bowel wall is compromised there is marked translocation and systemic exposure to aerobic and anaerobic organisms with their associated toxins, rapidly produce septic shock.

CLOSED LOOP OBSTRUCTION

This occurs when the bowel is obstructed at both the proximal and distal point. When gangrene of the strangulated segment is imminent, retrograde thrombosis of the mesenteric veins results in distension on both sides of the strangulated segment.

COLONIC OBSTRUCTION

¹³Colonic obstruction has both generalized systemic effects and important local effects of the obstructed bowel. Depends on competence of the ileo caecal valve and the location, degree and chronicity of

obstruction. A distally obstructed colon also prevents normal small bowel function. The effects on both large and small bowels eventually result in third space fluid and electrolyte losses with hypovolemia, bacterial overgrowth and malnutrition that contribute to the morbidity of the condition and the risk of treatment¹⁴. Closed loop obstruction occurs in a carcinoma right colon with constrictive lesion. If the ileocaecal valve is competent and if the obstruction is total, the intraluminal pressure within the colon increases. As a result of which caecum may distend grossly and may perforate when its radiographic diameter exceeds 10 to 12 cms.

FLUID AND ELECTROLYTE BALANCE AND PRINCIPLES IN TREATMENT

1. FLUID AND ELECTROLYTE BALANCE AND DISTURBANCES :

In acute intestinal obstruction the changes occur in

- a) Blood and plasma volume
- b) Water and electrolyte balance

This is made up of whatever fluid the patient has ingested before surgery as well as various digestive juices. About 8000ml is secreted in 24 hrs.

Saliva	–	1500ml
Gastric juices	–	2500 ml
Bile and pancreatic juices	–	2000 ml
Succus entericus	–	2000 ml

In obstruction absorption of water and electrolytes from gut is retarded but secretion of digestive juices into the lumen persists or is even increased.

Moynihan states that 6% of body weight is lost when the patients, moderately dehydrated and 10% when it is severe. The daily water balance in health is as follows :

No.	Intake	Output	
1.	Water from beverages 1200ml	Urine	1500 ml
2.	Water from solid food 1000ml	Faeces	100ml
3.	Water from Oxidation 300ml	Insensible perspiration	900ml
	Total		2500ml
			2500ml

The biochemical changes are related to the site, extent and duration of obstructions. The common denominator in the systemic response to intestinal obstruction involves the isotonic contraction dehydration that accompanies not only the intestinal and peritoneal sequestration of ECF but also the associated vomiting.

¹⁵In proximal obstruction there is relatively more vomiting and this leads to loss of water, sodium, chloride, hydrogen and Potassium ions producing dehydration with hypochloremia, hypokalemia and metabolic alkalosis.

In distal small bowel obstruction may cause loss of large quantities of fluid but the abnormalities of serum electrolyte values are less dramatic.

BIO CHEMICAL CHANGES

Volume	ICF -	No change
	ECF -	↓
Plasma Na ⁺	-	No change
Hematocrit, plasma Proteins	-	↑
Urinary Excretion Na ⁺		↓
H ₂ O	-	↓

In strangulation obstruction there will be elevation of serum phosphate, lactate dehydrogenase, amylase, alkaline phosphatase, and ammonia levels this depends and varies with time and degree of ischemic insult and length of intestine involved.

2. PRINCIPLES OF TREATMENT IN ELECTROLYTE

DISTURBANCE

1. It has been shown that bowel especially ileum secretes water and electrolytes and absorption of sodium, potassium and water is reduced for at least 48 hrs following the relief of obstruction.
2. The decompression increases the fluid loss during the first 6 hrs after surgery.
3. The thickened edematous bowel surface loses the absorption and transfer of water and electrolytes.
4. So all these suggest the increased requirement of fluid and electrolyte in the post operative period.

DIAGNOSIS OF ACUTE INTESTINAL OBSTRUCTION

¹⁶There are four cardinal features

1. Pain
2. Vomiting
3. Distension
4. Constipation

These features vary according to

- The location of obstruction
- The duration of the obstruction
- The underlying pathology
- The presence or absence of intestinal ischemia.

Late manifestation which may be encountered include, dehydration, oliguria, hypovolemic shock, pyrexia, septicaemia, respiratory embarrassment, peritonism and multiple system organ failure (MSOF).

1. Pain
 - Pain is the first symptoms it occurs suddenly and usually severe. It is colicky in nature, usually

centered around umbilicus in small bowel obstruction and more laterateralised in large bowel obstruction, coincides with increased peristaltic activity with increasing distention, the colicky pain is replaced by mild constant diffuse pain. The development of severe diffuse constant pain is indicative of the presence of strangulation. It does not occur in paralytic ileus.

2. Vomiting - The more distal the obstruction, the longer the interval between the onset of symptom and the appearance of nausea and vomiting. As obstruction progresses the character of the vomits alter from digested food to feculent material due to presence of enteric bacterial over growth. ¹⁷Lower obstruction results in vomiting after 8 – 10 hrs, whereas high obstruction results in vomiting in 2 – 3 hrs.
3. Distension - In the small bowel the degree of distention is dependent on the site of the obstruction and is greater the more distal the lesion, visible peristalsis may be present.
4. Constipation - This may be classified as absolute (ie neither feces nor flatus in passed) or relative. Absolute

constipation is a cardinal feature of complete intestinal obstruction.

5. Dehydration - This is seen most commonly in small bowel obstruction due to repeated vomiting and fluid sequestration. This results in dry skin and tongue, poor venous filling, sunken eyes with oliguria. The blood urea level and hematocrit rise giving a secondary polycythemia picture.
6. Pyrexia - Pyrexia in the presence of obstruction may indicate.
 - The onset of ischemia
 - Intestinal perforation
 - Inflammation associated with the obstructing disease.
7. Hypothermia - Indicates septicaemic shock.
8. Abdominal Tenderness - Localised to generalized tenderness indicate impending or established ischemia, gangrene or perforation.
9. Auscultation - ¹⁸Hyperactive bowel sounds with audible rushes associated with vigorous peristalsis (Borborygmi), late presentation bowel sounds minimum / absent.
10. Per Rectal Examination - To assess for intraluminal mass like rectal growth, prostate enlargement.
 - Ballooning of rectum.

CLINICAL FEATURE OF STRANGULATION

It is vital to distinguish strangulating from non strangulating intestinal obstruction, as the former is a surgical emergency. The diagnosis is entirely clinical. In addition to the features outlined above the following should be noted.

- ¹⁹The presence of Tachycardia, hypotension, fever, leucocytosis and localised tenderness indicate underlying ischemia. If 2 or more features present strangulation is present in 90% of cases.
- In impending strangulation, pain is never completely absent.
- Symptoms usually commence suddenly and return regularly.
- In non strangulated obstruction there may be an area of localized tenderness at the site of an obstruction. In strangulation there is always localized tenderness associated with rigidity / rebound tenderness.
- In cases of intestinal obstruction when pain persists despite conservative management, even in the absence of the above signs, strangulation should be diagnosed.

- When strangulation occurs in an external hernia the lump is tense, tender irreducible, there is no expansile cough impulse and it has recently increased in size.

²⁰The presence of signs of peritoneal irritation and systemic toxicity mandate for early laparotomy; However their absence cannot reliably exclude strangulation.

RADIOLOGICAL DIAGNOSIS:

1. PLAIN RADIOGRAPH OF ABDOMEN SUPINE AND ERRECT:

²¹It usually confirm the clinical suspicion and define more accurately the site of obstruction. Sensitivity 70-80% and specificity low.

Supine Flim:

•**Small Bowel Obstruction** : Dilated small bowel loops (> 3cm diameter) without evidence of colonic distension.

•**Large Bowel Obstruction** : Marked Dilated colon with fluid level. Impossible to make ascertain diagnosis.

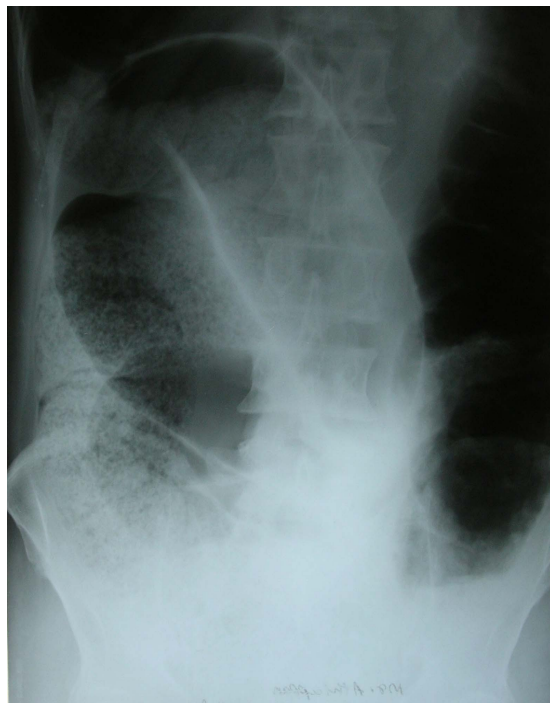
•**Volvulus** : Marked gaseous distension of sigmoid loop extending from the pelvis to diaphragm, smooth loop with lacking in haustra. (Bent inner tube on coffee bean appearance).

Errect Flim : Multiple Air fluid level which often layes in a stepwise pattern. In Small bowel obstruction number of fluid level is directly proportional to the degree of obstruction and to its site. The number increases the more distal the lesion. Low colonic obstruction

X-RAY ABDOMEN ERRECT



MULTIPLE AIR FLUID LEVELS



COFFEE BEAN APPEARANCE (SIGMOID VOLVULUS)

does not commonly give rise to small bowel fluid levels unless advanced while high colonic obstruction may do in the presence of an incompetent ileocaecal valve.

Volvulus : Fluid level will be seen.

²²In the more complex patient in which the diagnosis is not readily apparent. CT scanning has proved to be beneficial.

2. BARIUM STUDIES:

- In Low grade and intermittent small bowel obstruction (Enteroclysis)
- Barium follow through or Gastrograffin study in partial small bowel obstruction.
- ²³Barium enema in equivocal cases a water soluble or barium enema may be performed to ascertain the diagnosis. This may actually resolve the volvulus in about 5% of adults (²⁴Birds beak or ace of spade appearance in sigmoid volvulus).

3. ULTRASONOGRAPHY OF ABDOMEN AND PELVIS

²⁵An a kinetic dilated loop observed on real time ultrasonography proved to have sensitivity 90% and specificity 93% for the recognition of strangulation, its positive predictive value for strangulation was 73%. The presence of peritoneal fluid was sensitive for strangulation.

3. COMPUTED TOMOGRAPHY OF ABDOMEN AND PELVIS:

It is sensitive for diagnosing complete and high grade obstruction (Tumours, Inflammatory diseases or abscess) sensitivity 80-90% and specificity 70-90%. But less sensitive in partial obstruction.

5. MAGNETIC RESONANCE IMAGING:

²⁶MRI identified the site and cause of bowel obstruction in most cases. So it is superior to CT scan in the pre operative diagnosis.

6. SIGMOIDOSCOPY

²⁷In suspected large bowel obstruction, sigmoidoscopy should be under taken. It may confirm the presence of carcinoma and it may prove therapeutic eg. in some patient with volvulus of the sigmoid colon.

Materials and Methods of Study

MATERIAL AND METHODS OF STUDY

In Coimbatore Medical College Hospital, Coimbatore in the year January 2004 to December 2005, 234 cases were admitted with the provisional diagnosis of Acute Intestinal Obstruction. In the same period total number of cases taken for emergency surgery in the general surgical side was 968.

To Conduct a study on Acute intestinal obstruction in adults an general survey was made on 234 cases. However the analytical and critical study was carried out only on the 75 cases which were operated upon. Immediately after admission, resuscitation was carried out personal particulars were recorded and detailed history was obtained. Thorough clinical examination was done. All routine and relevant special investigations when available were carried out. After confirmation of diagnosis, patient were subjected to emergency surgery as warranted.

When ever possible the histopathological examination of the specimen was carried out, to confirm the clinical diagnosis. Post

operative course was closely observed until the first follow up visit. The above facts were recorded in a Proforma prepared for this study.

The following cases were excluded from this study:

1. Acute Intestinal Obstruction in children below 12 yrs.
2. A dynamic Intestinal Obstruction and colonic pseudo obstruction.
3. Intestinal Obstruction treated conservatively.

PRE OPERATIVE MANAGEMENT

For all admitted cases which were diagnosed provisionally as Acute intestinal Obstruction, the following management were done routinely, during the Pre operative period.

1. I.V. line with wide bore cannula were inserted and intra venous fluid started mostly with crystalloid solutions.
2. Gastric decompression with Ryles tube done.
3. Urinary catheter inserted to monitor output.
4. Complete haemogram, Blood urea, sugar, Serum Creatinine, Blood grouping and Serum electrolyte were done.
5. Hourly Abdominal Girth, Blood pressure, pulse, Temperature, Respiration were monitored.
6. X-ray Chest, X-ray Abdomen, Erect and Supine view were taken.

7. USG Abdomen, CT Abdomen, done in Equivocal cases.
8. Parenteral antibiotics given routinely.
9. Repeated clinical examinations to assess the progress of the condition done.
10. Patients not improved with above management were taken up for surgery.

Indications of Operation

1. Failure to respond to conservative treatment.
2. In strangulation
3. In acute colonic obstruction, especially when distension is marked.

Observations in this Study

OBSERVATIONS IN THIS STUDY

During the study period, the total number of patients with Acute Intestinal Obstruction who under went surgery was seventy five. Total number of acute intestinal obstruction with provisional diagnosis is 234. This contribute 32% of the provisional diagnosis of acute intestinal obstruction in the year Jan. 2004 to Dec. 2005.

ETIOLOGICAL FACTORS

The following tables shows the various etiological factors leading to Acute intestinal obstruction in the present series

SL.NO	DIAGNOSIS	TOTAL	PERCENTAGE (%)
1.	External Hernias a) Ingunial b) Femoral	40 35 5	53%
2.	Adhesions and Bands a) post operative b) Idiopathic	21 20 1	28%
3.	Colonic growth	6	8%
4.	Sigmoid Volvulus	4	5%
5.	Abdominal tuber culosis	2	3%
6.	Intussusception	2	3%

	Total	75	100%
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I. EXTERNAL HERNIAS

A hernia is a protrusion of a viscus or part of a viscus through an abnormal opening in the wall of its cavity. The obstructed hernia is a irreducible hernia containing intestine which is obstructed from without or within, but there is no interference to the blood supply to the bowel.

Incidence

The obstructed external hernia is the most common cause of intestinal obstruction in our study.

Total cases - 40

Inguinal hernia - 35

Femoral hernia - 5

1. INGUINAL HERNIA

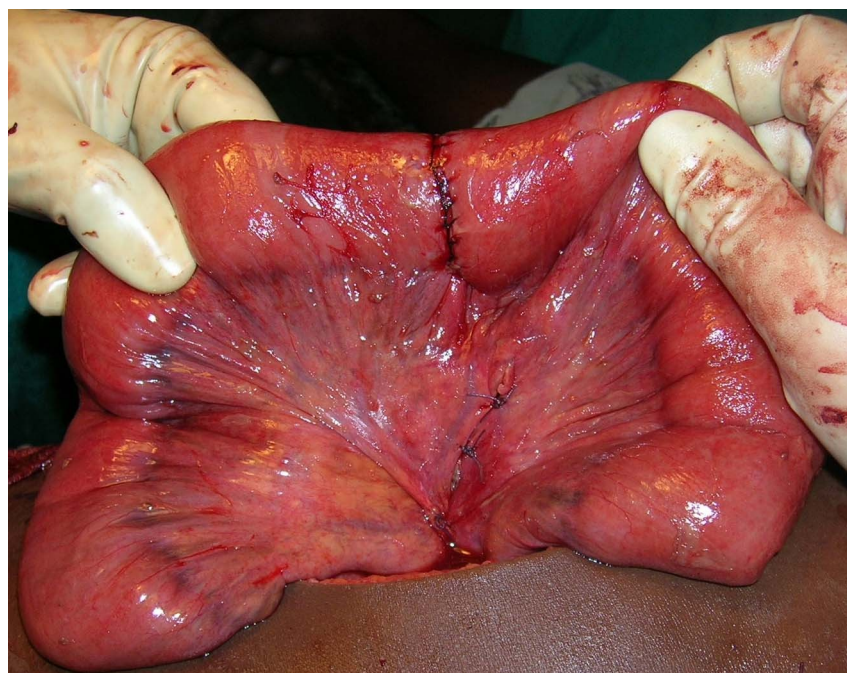
This is commonest approximately 75% of all the hernias and no female is reported in this series.

PRE – OPERATIVE FEATURES

The symptoms colicky abdomen pain, vomiting and tenderness over the hernial site are less severe and the onset more gradual than in the cases of strangulation.



STRANGULATED HERNIA WITH SMALL BOWEL GANGRENE



RESECTION AND ANASTOMOSIS

The right side is more commonly affected than the left.

Right side - 25 Left side - 10

This proves the statement that the later descent of testis on the right side and the later obliteration of the processus vaginalis contribute to the high incidence on the right side.

²⁸Strangulation is much more common when a hernia is the underlying cause of small bowel obstruction, compared with adhesion.

No. of Cases of Obstruction

1. First episode - 25 cases
2. Recurrent episode - 10 cases

ASSOCIATED DISEASES

Cases had following associated condition.

- a) Moderate enlarged prostate - 12
- b) Chronic cough - 7

c) Hydrocele - 4

Condition a(or) b had contributed to the increased intraabdominal pressure.

PER OPERATIVE FINDINGS

1. Condition of bowel in the herinial sac

a) Viable - 22
b) Gangrenous - 13

2. Level of obstruction

a) at the level of internal ring - 28
b) at the level of external ring - 7

3. Bowel involved

a) small bowel - 27
b) large bowel - 3
c) Omentum - 0
d) small bowel and omentum - 4
e) small bowel with bladder wall - 1

MANAGEMENT

S.No.	Procedure	No. of Cases	Indications
1.	Exploration, reduction and bassini's herniorrhaphy a. with orchidectomy b. without orchidectomy	1 17	For uncomplicated cases
2.	Resection, Anastomosis and bassini's herniorrhaphy a. with orchidectomy	4	For cases with gangrene

	b. without orchidectomy	9	of bowel
3.	Reduction, bassini's heriniorrhaphy and eversion of sac	4	For associated hydrocele

POST OPERATIVE PERIOD

Complications

1. Two patients died in the early post operative period. One due to myocardial infarction and other due to septicemia and respiratory disease.
2. Wound infection - 10
3. Haematoma - 3
4. Wound gapping - 6
 - Healed spontaneously - 4
 - Required resuturing - 2
5. Prolonged ileus - 2

2. FEMORAL HERNIA

Of all the hernias it is the most liable to become strangulated mainly because of the narrowing of the sac and the rigidity of the femoral ring.

INCIDENCE

Femoral hernia is the third most common type of hernia. It accounts for about 20% of hernia in women and 5% in men. Strangulation is the initial presentation of 40% femoral hernia.

Total cases	-	5
Female	-	4
Male	-	1

PRE - OPERATIVE FEATURES

In all cases there was no history of similar previous episodes. Out of 5 cases four were female one was male patient. These cases presented with signs of strangulation.

PER - OPERATIVE FINDINGS

1. Condition of the bowel
 - a. Viable - 2
 - b. gangrenous - 3
2. Level of obstruction
 - a. Femoral ring - 5
3. Bowel involved
 - a. Small bowel - 5
 - b. Large bowel - 0

MANAGEMENT

S. No.	Procedure	No. of Cases
1.	Exploration, Reduction and repair (low approach) – Lock wood	2
2.	Exploration, resection and anastomosis of gangrenous, small bowel (high approach) Mc evedy	3

POST OPERATIVE PERIOD

Complications

1. Wound infection - 2
2. Wound gaping - 1

(Healed spontaneously)

II. ADHESIONS AND BANDS

In our series 21 cases were due to adhesions and bands (28%). In this series it was found more in males 15 cases and post operative cases (20 cases) 4 cases presented with recurrent attacks of intestinal obstruction and previously treated conservatively. ²⁹Partial obstruction treated conservatively with resuscitation and tube decompression in 60-80%.

Total – 21

Male : 15

Female: 6

CAUSATIVE FACTORS

- | | | |
|-----------------------------|---|----|
| 1. Post operative adhesions | - | 20 |
| 2. Idiopathic | - | 7 |

PER-OPERATIVE FINDINGS

All cases presented with signs and symptoms of acute intestinal obstruction.

1. Condition of bowel

a. Viable	-	17
b. Gangrenous	-	4



ADHESIONS AND BAND

2. Bowel involved

- a. Small bowel - 18
- b. Large bowel - 3

3. Type of adhesions

- a. Localised - 13
- b. Generalised - 8

MANAGEMENT

S.No.	Procedure	No. of cases
1.	Laparotomy and release of adhesions	15
2.	Laparotomy adhesiolysis, resection and anastomosis	4
3.	Laparoscopic adhesiolysis	2

POST OPERATIVE PERIOD

Complications

1. Two patients died in the early post operative period due to ARF and septicemia.
2. Wound infection – 4 cases
3. Wound gapping – 2 cases (Resuturing)
4. Broncho Pneumonia – 1 case.

Prevention

The following factors may limited adhesion formation.

1. Good surgical technique.
2. Washing of the peritoneal cavity with saline to remove clots etc.
3. Minimising contact with gauze.
4. Covering anastomosis and raw peritoneal surface with omentum.
5. The use of absorbable or non reactive sutures.
6. Maintenance of adequate hemostasis.

³⁰Laparoscopy can be performed in a high percentage of patients requiring surgery for acute small bowel obstruction in adhesion. Hospital stay was reduced but the risk of early unplanned reoperation was increased.

III. INTUSSUSCEPTION

This occurs when one portion of gut becomes invaginated with in an immediately adjustment segment. Invariably it is the proximal in to distal bowel.

In our series two case were reported.

Male : 1

Female : 1.

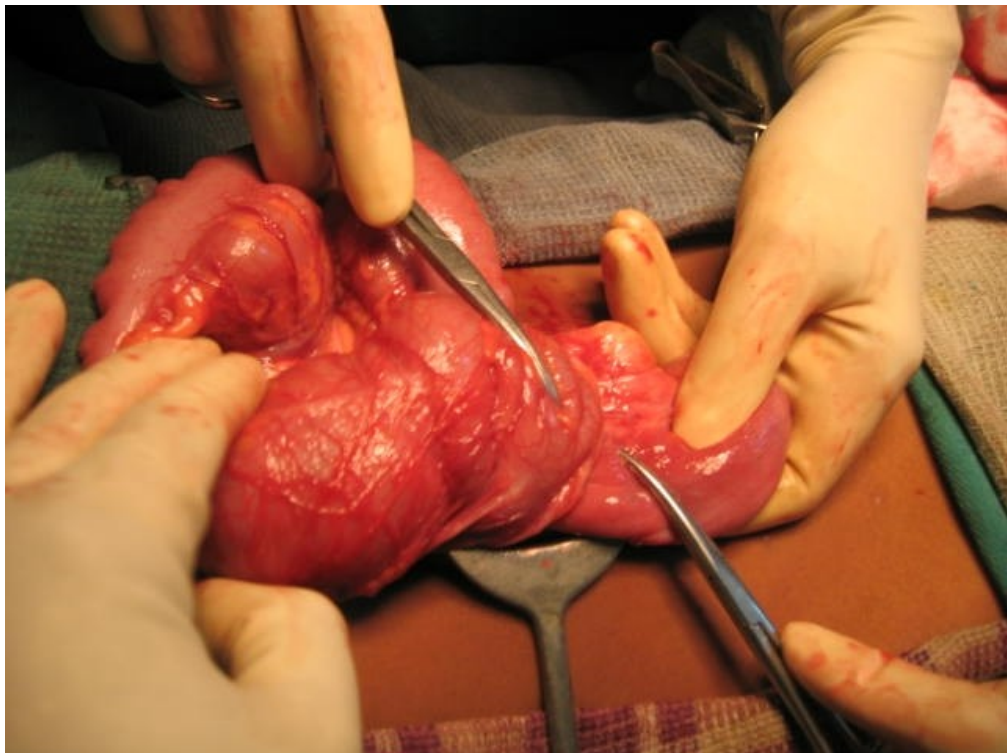
The two cases (3%) presented with initial intermittent colicky abdominal pain, treated privately for dysentery. The female patients had recurrent obstruction history and treated conservatively previously is a case of peutz jeghers syndrome. Who also had positive family history.

PER OPERATIVE FINDINGS AND MANAGEMENT

S. No.	Type	No. of Cases	Condition of Bowel	Causative Factor	Management
1.	Ileoileal	1	Gangrenous	Polyp (Peutz jeghers syndrome)	Laparotomy, Resection and Anastomosis
2.	Ileocaecocolic	1	Viable	Idiopathic	Laparotomy and Reduction

Post Operative Period

- Both patients recovered well.



INTUSSUSCEPTION

IV. ABDOMINAL TUBERCULOSIS

In this series two cases (3%) had tuberculosis involvement of ileum(1) and ileocaecal region (1).

Total – 2 Male : 2

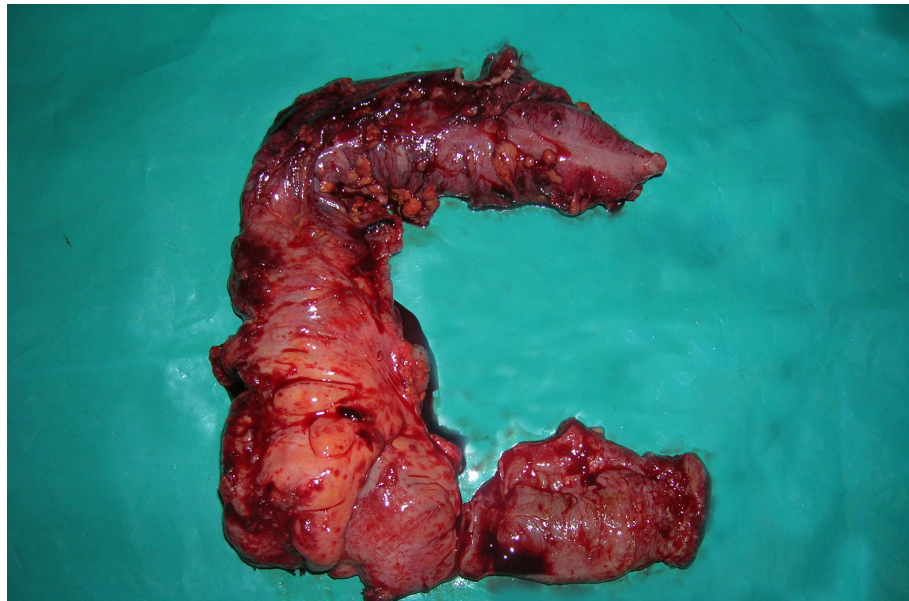
³¹Intestinal obstruction is the most common complications in the small bowel affecting 60% of patients with tuberculous enteritis.

PRE-OPERATIVE FEATURES

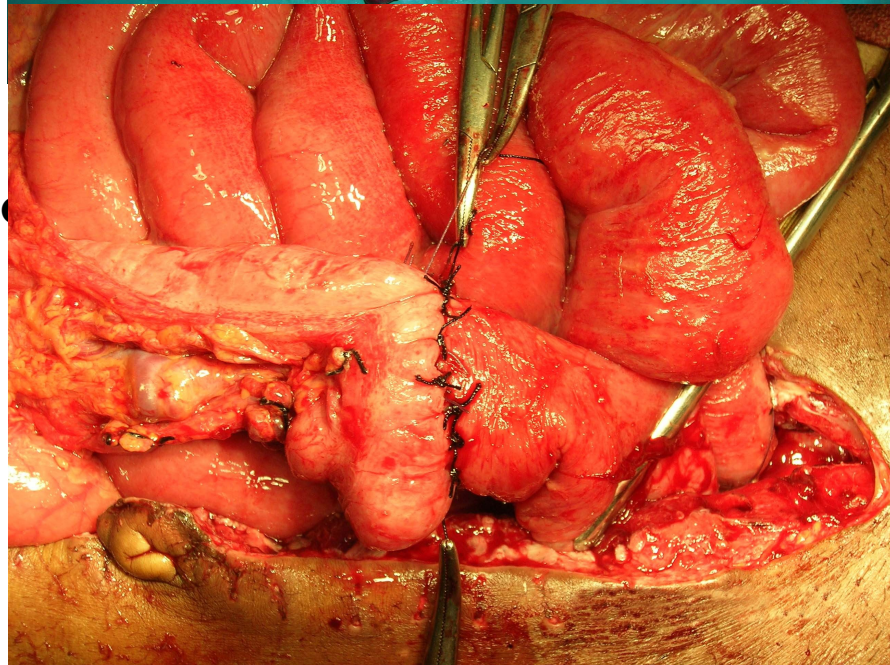
The patients were presenting with a dull aching pain abdomen over right iliac fossa, vomiting, abdomen distension alteration in the bowel habits, progressive loss of weight and one case had associated pulmonary tuberculosis with generalised lymphadenopathy.

PER OPERATIVE FINDINGS AND MANAGEMENT

S. No.	Condition of Bowel	No. of Cases	Management
1.	Multiple strictures in ileum with mesenteric node enlargement.	1	Laparotomy, resection and anastomosis of stricturous portion.
2.	Ileocaecal mass with mesenteric node enlargement	1	Laparotomy and right hemicolectomy with ileotransverse anastomosis



ILEO



ILEOTRANSVERSE ANASTOMOSIS

For both cases biopsy was taken from the involved area and HPE report came as tuberculous lesion. Anti tuberculous treatment was started for both cases in the post operative period.

POST – OPERATIVE PERIOD

1. Wound gapping - 1 Case (Healed spontaneously)

V. MALIGNANT LARGE BOWEL OBSTRUCTION

In our series 6 cases (8%) admitted with features of Acute intestinal obstruction had stenosing type of colonic growth. ³²Acute intestinal obstruction is the presenting symptom of colon carcinoma in 20% of cases.

Male : 4

Female : 2

PRE – OPERATIVE FEATURES

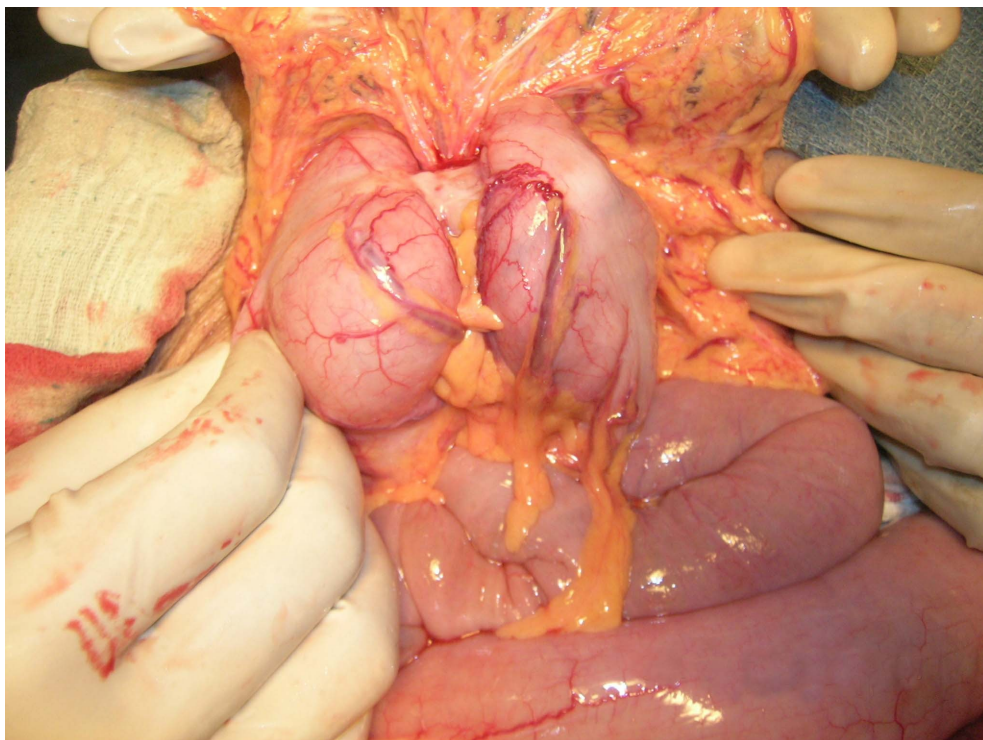
All patients presented with constipation followed by abdominal pain and abdominal distension. No patients had history of melena or bleeding

per rectum. In all patients the lesion was above the level of mid rectum.

So per rectal examination didn't reveal any findings.

PER OPERATIVE FINDINGS AND MANAGEMENT

Sl.No.	Site of Lesion	No. of Cases	Management
1.	Descending colon	3	Proximal loop colostomy
2.	Transverse colon	1	Right hemicolectomy
3.	Sigmoid / Recto sigmoid	2	Proximal loop colostomy



TRANSVERSE COLON GROWTH

POST OPERATIVE PERIOD

1. HPE report of all cases came as adeno carcinoma of colon
2. Complications
 - One patients died in the early post operative period due to septicemia and ARF (Recto sigmoid growth)
 - Wound infection 2 cases
 - Wound gapping 1 case

³³The concept of resection and primary anastomosis now is accepted by virtually all surgeons for treating carcinoma of right and transverse colon proximal to the splenic flexure. In the large bowel cancer project

the incidence of anastomotic leak was 10% compared with 6% for patient without obstruction.

VI. SIGMOID VOLVULUS

A volvulus is a twisting or axial rotation of a portion of bowel about its mesentery. When complete it forms a closed loop obstruction with resultant ischemia secondary to vascular occlusion. It is the most frequent cause of strangulation obstruction in the colon.

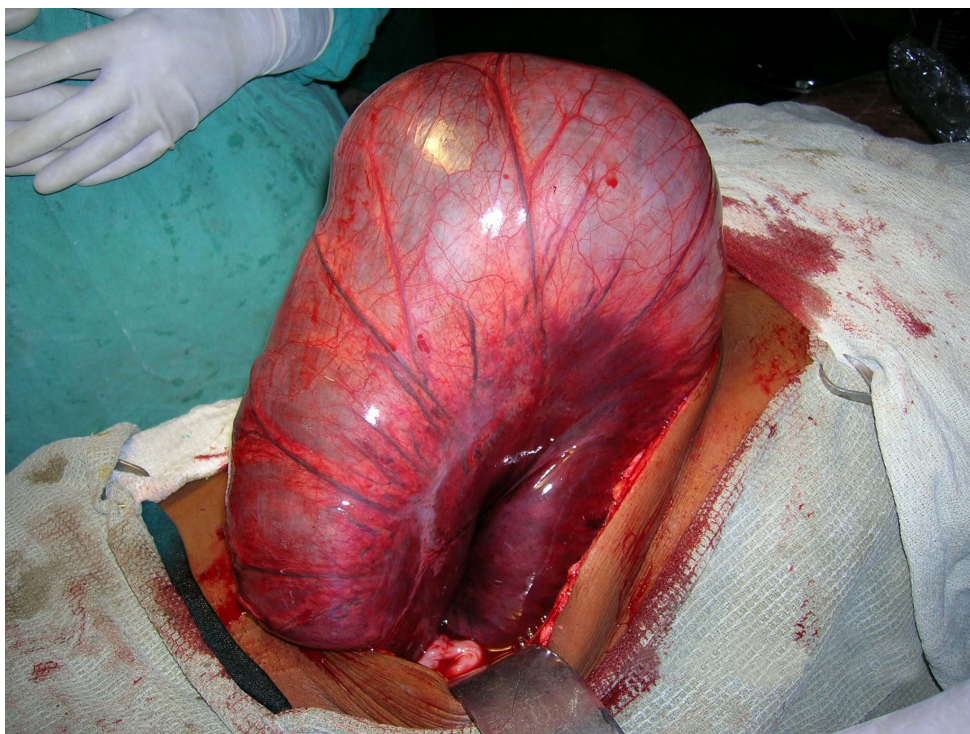
In our series there were 4 cases (5%) of sigmoid volvulus. Male (4) predominate and maximum cases were seen in 7th decade of life.

PRE OPERATIVE FEATURES

All cases presented with Abdominal distention and constipation as main complaints. Vomiting was present in only 2 cases.

PER OPERATIVE FINDINGS

All were sigmoid volvulus and had redundant sigmoid with long mesocolon. All had anticlockwise rotation from $\frac{1}{2}$ to 2 full turn of varying degrees.



SIGMOID VOLVULUS WITH GANGRENE

MANAGEMENT

Sl.No.	Management	No. of Cases	Indications
1.	Resection and hartmann's procedures	2	Gangrenous bowel and toxemia
2.	Resection and primary anastomosis with loop colostomy	2	Viable bowel

POST OPERATIVE PERIOD

Complications

1. One patients died in the 3rd post operative day due to septicemia.

2. Wound infection – 1

3. Wound gapping – 1

Discussion

DISCUSSION

General surgeons are more often bound to face the emergency of Acute intestinal obstruction in most of the duty days. So the analytic study was focused to acute intestinal obstruction in adults. Out of 234 cases admitted with provisional diagnosis of acute intestinal obstruction in the year January 2004 to December 2005 in all units of our surgical department, 75 cases who underwent surgical management were taken up for analytical study.

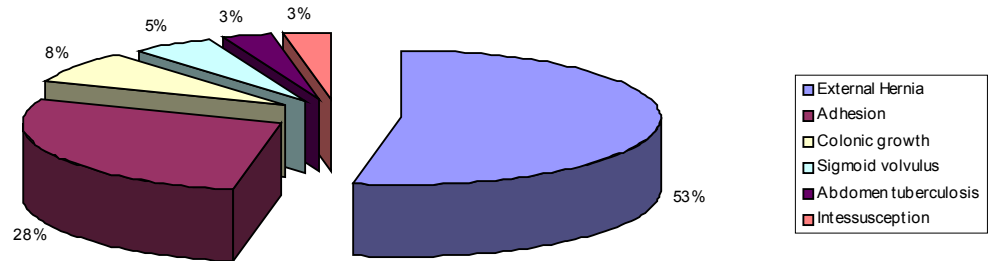
This contribute 32% of the provisional diagnosis of acute intestinal obstruction in the year January 2004 to December 2005. In the same period total numbers of cases taken up for emergency surgery in the general surgical side was 968. Acute intestinal obstruction contribute 7.74% of all emergency surgery.

ETIOLOGICAL INCIDENCE

The obstructed external hernias tops the list and stands first among the commonest cause of acute intestinal obstruction in adults. This is followed by adhesions and bands, colonic growth, sigmoid volvulus, tuberculous abdomen and intussusceptions contribute the rest in descending order.

- | | | |
|----|--------------------|----------|
| a) | Simple obstruction | 52 (69%) |
| b) | Strangulation | 23 (31%) |

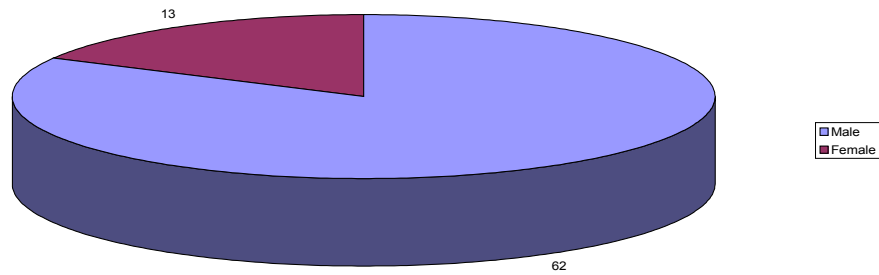
Etiological Incidence



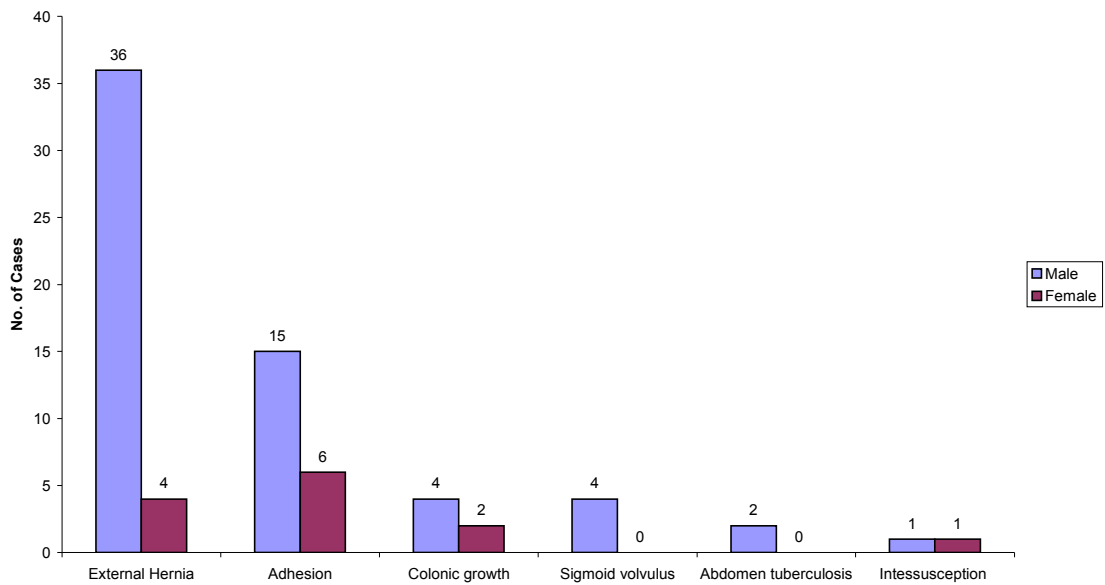
SEX INCIDENCE

The male female ratio of the present series is 4.7 : 1 showing the predominance of male. This is probably due to the higher incidence of inguinal hernias, adhesion and volvulus in men than in women.

SEX INCIDENCE



Sex Incidence of Diseases

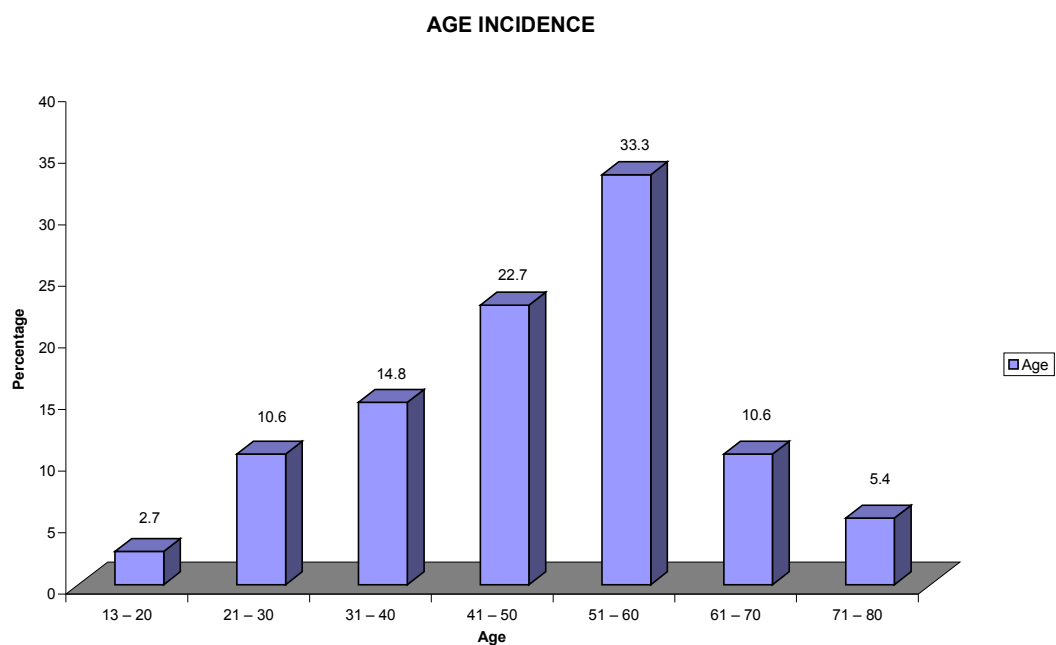


AGE INCIDENCE

The maximum no. of cases were seen in this series between 31 – 60 yrs. The age more than 60 years are more prone for complications.

Age Group	No. of Cases	Percentage
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13 – 20	2	2.7
21 – 30	8	10.6
31 – 40	11	14.8
41 – 50	17	22.7
51 – 60	25	33.3
61 – 70	8	10.6
71 – 80	4	5.4



SOCIO ECONOMIC STATUS

Most of them belongs to low income group.

LITERACY

Poorly literate people were involved in this series much poorly uneducated people fail to come forward to seek medical advise before getting complication such as strangulated hernia.

CLINICAL FEATURES

Most cases presented with pain abdomen, vomiting followed by distension and few with constipation. ³⁴Most cases of small bowel obstruction can be diagnosed with the combination of clinical features and radiographic findings.

Sl.No.	Symptoms	No. of Cases
1	Pain	75
2.	Vomiting	47
3.	Distension	38
4.	Constipation	10

INCIDENCE WITH PREVIOUS SURGERY

Previous surgery is main cause for the obstruction due to bands and adhesions. 20 cases were operated previously.

Sl. No.	Surgery	No. of Cases
1	Elective a) Clean b) Contaminated	7
2.	Emergency a) Clean b) Contaminated	13

INVESTIGATIONS

Along with clinical history, diagnostic investigations is essential to come into final diagnosis. eg. Laboratory tests, radiography and ultra sound.

Most of the patients were presented with uremia due to dehydration, few with electrolyte imbalance and leucocytosis in cases of strangulation. In most cases of small bowel obstruction x-ray abdomen erect showed multiple air fluid levels which was diagnostic.

Sl.No.	Test	No. of Cases	
		Normal	Elevated
1.	Blood Urea	32	43
2.	Serum creatinine	64	11
3.	WBC count	58	17

The Time Factor

In this study patients admitted with late presentation had higher mortality and developed more complications in the post operative period.

There is definite relationship between the duration of obstruction and successful surgery. Sir, H. OGILIVIE stated "In acute abdominal emergencies difference between the best and the worst surgery is infinitely less than between the early and the late surgery and the great scarifies of all of them in the sacrifice of time".

Analysis of time interval between admission and surgery.

Sl.No.	Duration of time period in hrs	No. of cases	Percentage (%)
1.	< 6	8	10.7
2.	6 – 12	39	52
3.	12 – 24	18	24
4.	24 – 48	6	8
5.	> 48	4	5.3

This shows 52% were operated in the 6-12 hrs period and 62.7% under went surgery in 12 hrs. 65 out of 75 patients under went surgery in the first 24 hrs of admission. ³⁵There is a direct correlation between the length of time that a patient has obstruction and the probability of strangulation occurring, early diagnosis and early surgery are the key for successful management of strangulated obstruction of the intestine.

³⁶A delay in operation for small bowel obstruction as shown increased mortality and mobility over operation immediately after fluid resuscitation.

THE ROLE OF THE SURGEON

³⁷A thorough understanding of the anatomy and physiology of the abdomen are essential to properly generate a differential diagnosis and to formulate a treatment plan while recent advances in technology can be extremely helpful in certain situations, they cannot replace a physicians clinical judgement based upon a good history and physical examination.

Emergency surgery needs quick diagnosis, quick decision and correct procedure. In poor general condition the minimum surgical procedure will render maximum results. As far as possible it is better to avoid exteriorization of small bowel eg. Ileostomy due to increased mortality.

The central dilemma for clinicians managing patients with intestinal obstruction is to determine if and when surgical intervention is indicated.

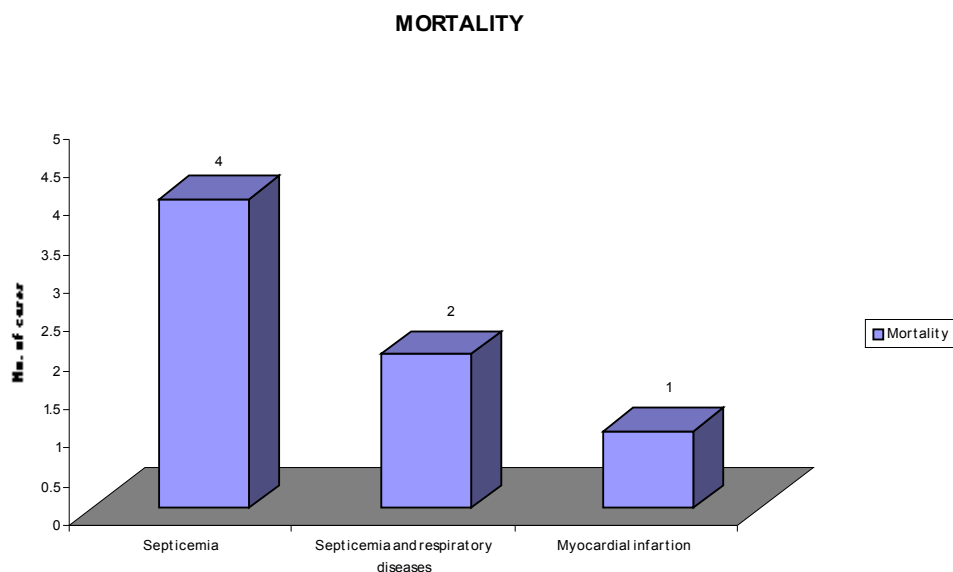
Though some patients are prone for post operative adhesions still it can be minimised by gentle handling of organs and following the basic principles of surgery.

MORTALITY

Out of 75 cases operated 6 (8%) patients died in the early post operative period. Mortality can be decreased in early presentation with adequate pre operative resuscitation and early surgery.

CAUSE OF MORTALITY

Sl.No	Cause	No. of Cases
1.	Septicemia	4
2.	Septicemia and respiratory diseases	2
3.	Myocardial infarction	1

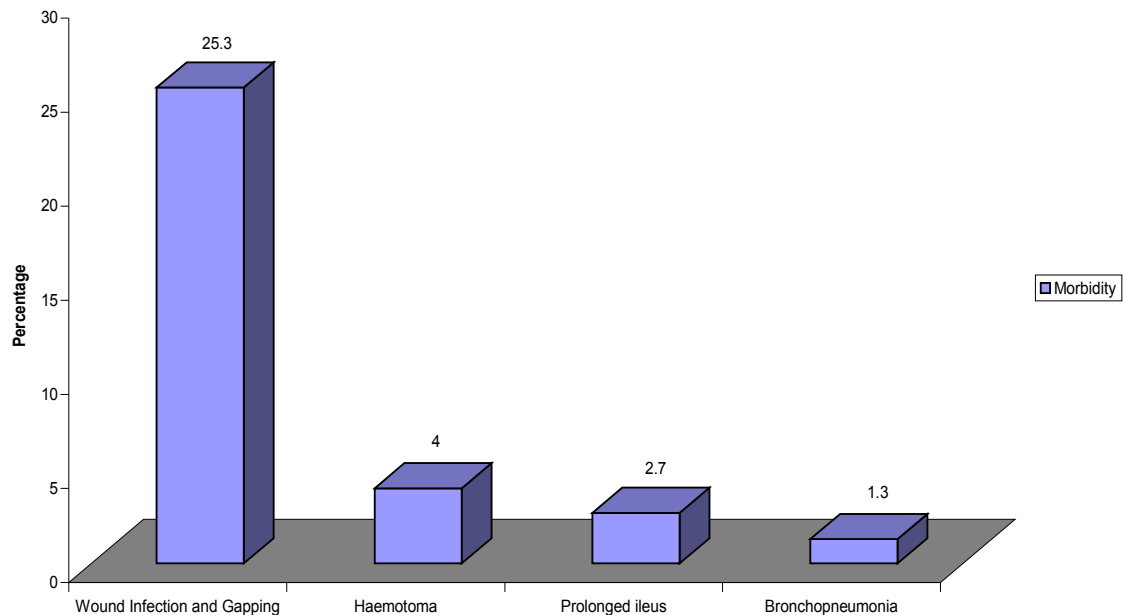


MORBIDITY

Out of 75 cases operated, the most common complication is wound infection (Morbidity is 33.3%). Morbidity can be reduced to very minimum with good aseptic precaution and pre operative antibiotics.

Sl.No.	Cause	No.of Cases	Percentage
1.	Wound Infection and Gapping	19	25.3
2.	Haemotoma	3	4
3.	Prolonged ileus	2	2.7
4.	Bronchopneumonia	1	1.3

MORBIDITY



PROGNOSIS

In this study cases admitted with late presentation in old age with severe dehydration, uremia, toxemia and also associated disease like diabetics mellitus, ischemic heart disease contributed to the poor prognosis. The cases admitted with early presentation had good prognosis with surgery.

Conclusion

CONCLUSION

Acute Intestinal Obstruction constitutes 7.74% of all emergency surgery in our general surgical department. Bulk of patients was from 31-60 years age group which represent 70.8%, male female ratio is 4.7:1. Most common cause of acute intestinal obstruction is obstructed inguinal hernia 53% followed by adhesions 28%, colonic growth 8%, sigmoid volvulus 5%, abdominal tuberculosis 3%, intussusception 3%. The incidence is more among the poor socio-economic group and uneducated people. About 33.3% of patients developed minor complications and overall mortality is 8%.

The thorough understanding of the anatomy and physiology of abdomen are essential to properly generate a differential diagnosis to formulate a treatment plan. While recent advances in technology can be extremely helpful in certain situation, they cannot replace a surgeons clinical judgement based upon a good history, physical examination and radiograph of abdomen.

The recent advances in surgery, the improvement in the techniques, aseptic and antiseptic measures, the rapid advances in anaesthesiology, better understanding of the fluid and electrolyte management, nasogastric tube decompression, antibiotics, and the basic and specific investigations

made the patient safer for modern surgery and greatly reduce the mortality rate.

Based on the results obtained acute intestinal obstruction is a real emergency and recognition of clinical status of obstruction at the shortest time interval and early intervention will be very essential because it minimises morbidity and mortality with a good prognosis.

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PROFORMA

- | | | |
|-------------------------|---|--------|
| Other medical illness | - | DM/HT |
| | - | IHD/PT |
| Intra abdominal surgery | - | |

Personal History

Diet	-	Yes / No
Smoking	-	Yes / No
Alcohol	-	Yes / No

Family History

History of GIT Cancer	-	Yes / No
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Menstural History

-

General Physical Examination

Conscious	-	Yes / No
Oriented	-	Yes / No
Attitude	-	Restless / Rigling with pain / Still
Dehydrated	-	Yes / No
Pallor	-	Yes / No
Icterus	-	Yes / No
Temperature	-	
Pulse	-	
BP	-	
Respiratory rate	-	

Examination of Abdomen**Inspection**

Movement with respiration	-	Yes / No
Distention	- Central	Yes / No
	- Peripheral	Yes / No
	- Regional	Yes / No
Umblicus position	-	
Flanks	-	Free / Full

Scars	-	Yes / No
Visible Mass	-	Yes / No
VIP	-	Yes / No
Hernial Orifice	-	Free or Not Free

Palpation

Local rise of temperature	-	Yes / No
Tenderness Localised	-	Yes / No
Generalized	-	Yes / No
Rebound	-	Yes / No
Guarding	-	Yes / No
Rigidity	-	Yes / No
Presence of mass in the abdomen	-	Yes / No
Hepatomegaly	-	Yes / No
Local examination of Inguinal Region	-	

Percussion

Liver dullness	-	Present / obliterated
Free Fluid	-	Yes / No

Auscultation

Bowel Sounds	-	Normal / increased / decreased / absent
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Per Rectal Examination

Other Systems	-	CVS	-
	-	RS	-

Pre Operative Diagnosis

Investigations

Routine	-	Urine - Albumin
		Glucose
		Deposit
		Stools – Occult blood
		Complete Hemogram
		HB
		TC
		DC
		Haematocrit
		Blood Glucose
		Blood Urea
		Serum Creatinine
		Serum Electrolytes
		Blood Grouping and typing
		Plain Chest X-Ray
		ECG

Specific

Plan X-Ray Abdomen	Errect
	Supine

Ultra Sound Abdomen / CT Abdomen

Treatment

Pre Operative Management

Operation	Emergency / Elective
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Per Operative Findings and Surgery

Post Operative Period

HPE Reports

Follow up

MASTER CHART

S. No.	Name	IP No.	Age / Sex	Investigation		Diagnosis	Procedure	Bowel Viability	Complications
				WBC Count	AXR				
1.	Sakthivel	1459	70/M	N	N	Right OIH	Exploration, Reduction and Herniorraphy	Viable	Nil
2.	Lakshmi	1470	48/F	↑	+	Left SFH	Resection and Anastomosis, High approach	Gangrene	WI/WG
3.	Selvaraj	5497	52/M	N	+	Adhesions	Adhesiolysis	Viable	Nil
4.	Jayaraj	6960	58/M	↑	+	Left OIH	Resection and Anastomosis with Herniorraphy	Gangrene	WI/WG
5.	Govindaraj	7210	38/M	N	+	Adhesions	Laparoscopic Adhesiolysis	Viable	Nil
6.	Asan Mohammed	10122	72/M	N	DSC	Sigmoid Volvulus	Resection and Hartmans Procedure	Gangrene	Dead
7.	Mariappan	11447	51/M	N	+	Right OIH	Resection and Anastomosis with Herniorraphy	Gangrene	Nil
8.	Subbulakshmi	11404	38/F	N	+	Adhesion	Adhesiolysis	Viable	Nil
9.	Rangasamy	13451	40/M	↑	+	Ileocaecal TB	Laparotomy, Resection Anastomosis	Viable Stricture	Nil
10.	Lakshmi	14450	42/F	N	+	Adhesions	Adhesiolysis	Viable	Nil
11.	Vadivel	14575	54/M	N	N	Right OIH	Reduction, Herniorraphy with eversion of sac	Viable	Haemotoma

S. No.	Name	IP No.	Age / Sex	Investigation		Diagnosis	Procedure	Bowel Viability	Complications
				WBC Count	AXR				
12.	Kalam	10864	46/M	↑	N	CA. Transverse colon	Right Hemicolectomy	Viable	Nil
13.	Vijayakumar	1314	40/M	↑	+	Right OIH	Resection and Anastomosis with Herniorraphy	Gangrene	WI/WG
14.	Kannan	18680	30/M	↑	+	Adhesions	Adhesiolysis	Viable	Nil
15.	Rajendran	1920	42/M	↑	+	Adhesions	Laparoscopic Adhesiolysis	Viable	Nil
16.	Senthil Kumar	24901	54/M	N	N	Right OIH	Reduction, Herniorraphy with eversion of sac	Viable	Haemotoma
17.	Apparao	25722	50/M	N	N	Left OIH	Reduction and Herniorraphy	Viable	Nil
18.	Shanthi	25741	18/F	↑	+	Intussus-ception	Laparotomy, Resection and Anastomosis	Gangrene	Nil
19.	Selvaraj	30749	55/M	↑	+	Right SIH	Resection and Anastomosis with Herniorraphy	Gangrene	Nil
20.	Subramani	31156	49/M	N	N	Right OIH	Reduction and Herniorraphy	Viable	Nil
21.	Rajan	34376	53/M	↑	+	Adhesions	Adhesiolysis, Resection Anastomosis	Gangrene	Dead
22.	Rajendran	35127	52/M	N	N	Left OIH	Reduction and Herniorraphy	Viable	Nil
23.	Loganathan	35987	58/M	N	+	Right OIH	Reduction and Herniorraphy	Viable	WI
24.	Selvam	36170	28/M	↑	+	Adhesions	Adhesiolysis	Viable	Nil
25.	Raja	37557	60/M	N	+	Right OIH	Reduction, Herniorraphy and eversion of sac	Viable	Nil
26.	Raju	39616	52/M	N	+	Adhesions	Laparoscopic Adhesiolysis	Viable	Nil

S. No.	Name	IP No.	Age / Sex	Investigation		Diagnosis	Procedure	Bowel Viability	Complications
				WBC Count	AXR				
27.	Chinnan	40409	49/M	↑	N	Left OIH	Resection and Anastomosis and Herniorraphy	Gangrene	Nil
28.	Vellingir	40419	30/M	N	N	Adhesions	Adhesiolysis	Viable	Nil
29.	Kariyannan	47723	58/M	↑	+	Right OIH	Reduction and Herniorraphy	Viable	WI
30.	Rajammal	48216	48/F	↑	+	Ca. descending colon	Proximal loop colostomy	Viable	Nil
31.	Sarojini	48299	50/F	N	+	Adhesions	Resection and Anastomosis Adhesiolysis	Gangrene	WI/WG
32.	Vellingiri	48885	56/M	N	N	Right OIH	Reduction and Herniorraphy	Viable	WI
33.	Manickam	50708	48/M	↑	+	Right SIH	Resection and Anastomosis with Herniorraphy	Gangrene	WI/WG
34.	Kalimuthu	53224	44/M	N	N	Ca. sigmoid colon	Proximal loop colostomy	Viable	WI
35.	Govindaraj	52863	52/M	N	+	Left OIH	Reduction and Herniorraphy	Viable	Nil
36.	Saraswathi	54313	42/F	N	+	Adhesions	Adhesiolysis	Viable	Nil
37.	Sathyamoorthy	47754	38/M	N	N	Right OIH	Reduction and Herniorraphy	Viable	WI
38.	Subramani	59803	71/M	↑	DSC	Sigmoid Volvulus	Resection and Anastomosis with loop colostomy	Viable	Nil
39.	Kannan	62895	45/M	N	N	Right OIH	Reduction and Herniorraphy	Viable	Nil
40.	Gurusamy	64624	52/M	N	+	Adhesions	Adhesiolysis	Viable	Nil
41.	Ramasamy	65645	70/M	↑	+	Right SIH	Resection and Anastomosis with Herniorraphy	Gangrene	Dead

S. No.	Name	IP No.	Age / Sex	Investigation		Diagnosis	Procedure	Bowel Viability	Complications
				WBC Count	AXR				
42.	Kanimuthu	1946	29/M	N	+	Left OIH	Reduction and Herniorraphy	Viable	Nil
43.	Myilathal	23791	72/F	↑	+	Left OFH	Resection and Anastomosis High approach	Gangrene	Nil
44.	Velusamy	3534	53/M	N	N	Ca descending colon	Proximal loop colostomy	Viable	WI/WG
45.	Jayakumar	5767	58/M	N	N	Left OIH	Reduction and Herniorraphy	Viable	Nil
46.	Murugan	5628	42/M	↑	+	Adhesions	Adhesiolysis	Viable	Nil
47.	Ayyasamy	6177	75/M	↑	DSC	Sigmoid Volvulus	Resection and Hartmanns Procedure	Gangrene	Nil
48.	Subban	7190	40/M	↑	+	Left OIH	Resection and Anastomosis Herniorraphy	Gangrene	Nil
49.	Essac	7224	27/M	↑	+	Ileocaecal TB	Right Hemicolectomy	Viable	Nil
50.	Shanthi	7284	28/F	N	+	Adhesions	Adhesiolysis	Viable	Nil
51.	Veeran	9272	67/M	N	N	Right OIH	Reduction and Herniorraphy	Viable	Nil
52.	Kandasamy	9974	38/M	N	+	Adhesions	Adhesiolysis	Viable	WI
53.	Lakshmi	9857	62/F	N	N	Ca Sigmoid	Proximal loop colostomy	Viable	Dead
54.	Magappan	12944	52/M	↑	+	Right OIH	Reduction and Herniorraphy	Viable	Nil
55.	Palaniappan	13434	70/M	N	+	Right OIH	Reduction and Herniorraphy	Viable	Nil
56.	Dhiram Babu	12796	29/M	N	+	Left OIH	Reduction and Herniorraphy	Viable	Nil
57.	Sahul Hameed	18812	42/M	↑	+	Adhesions	Adhesiolysis , Resection and Anastomosis	Gangrene	Dead

S. No.	Name	IP No.	Age / Sex	Investigation		Diagnosis	Procedure	Bowel Viability	Complications
				WBC Count	AXR				
58.	Palaniappan	22122	50/M	↑	+	Right SIH	Resection and Anastomosis with Herniorraphy	Gangrene	Nil
59.	Muthusamy	22434	60/M	N	+	Adhesions	Adhesiolysis	Viable	Nil
60.	Tamilselvan	22316	57/M	N	+	Left OIH	Reduction and Herniorraphy	Viable	Nil
61.	Krishnan	25766	16/M	N	N	Intussusception	Laparotomy and Reduction	Viable	Nil
62.	Kalimuthu	25217	55/M	N	N	Right OIH	Reduction and Herniorraphy	Viable	Nil
63.	Divya	25813	38/F	N	+	Adhesions	Adhesiolysis	Viable	Nil
64.	Natarajan	29679	69/M	N	DSC	Sigmoid Volvulus	Resection and Anastomosis with Loop Colostomy	Viable	WI/WG
65.	Raman	24218	30/M	↑	+	Right OIH	Resection and Anastomosis with Herniorraphy	Gangrene	Nil
66.	Ayyasamy	25322	48/M	N	+	Left OFH	Exploration and Reduction Low Approach	Viable	Nil
67.	Kittan	29672	60/M	N	N	Right OIH	Reduction and Herniorraphy	Viable	WI
68.	Kannan	29693	40/M	↑	+	Adhesions	Adhesiolysis	Viable	WI
69.	Pappathi	33184	62/F	↑	N	Right OFH	Resection and Anastomosis High Approach	Gangrene	Nil
70.	Periyasamy	33192	60/M	↑	+	Right OIH	Resection and Anastomosis Herniorraphy	Gangrene	WI/WG

S. No.	Name	IP No.	Age / Sex	Investigation		Diagnosis	Procedure	Bowel Viability	Complications
				WBC Count	AXR				
71.	Vasudevan	34101	58/M	N	N	Right OIH	Reduction and Herniorraphy	Viable	WI
72.	Marathal	32124	40/F	N	+	Right OFH	Exploration and Reduction Low Approach	Viable	WI
73.	Sakthivel	34190	48/M	N	+	Right OIH	Reduction and Herniorraphy	Viable	Haemotoma
74.	Veeran	35132	60/M	↑	N	Ca descending colon	Proximal loop colostomy	Viable	Nil
75.	Muthusamy	35198	51/M	↑	+	Adhesions	Resection and Anastomosis Adhesiolysis	Gangrene	WI/WG

OIH - Obstructed Inguinal Hernia

SIH - Strangulated Inguinal Hernia

OFH - Obstructed Femoral Hernia

SFH - Strangulated Femoral Hernia

DSC - Dilated Sigmoid Colon

TB - Tuberculosis

Ca -Carcinoma

WBC - White Blood Count

AXR - Abdomen X-Ray Errect

MFL - Multiple Air Fluid Level (> 5 levels)

N - Normal

↑ - Increased

WI - Wound Infection

WG - Wound Gapping

